

## 12.0 Mexican Hat, Utah, Disposal Site

### 12.1 Compliance Summary

The Mexican Hat, Utah, Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I Disposal Site was inspected on April 29, 2008. The disposal cell and all associated surface water diversion and drainage structures were in excellent condition and functioning as designed. Runoff from storm events continues to transport sediment into the west diversion channel, resulting in low-density vegetation growth within the entire length of the channel; however, the performance of the diversion channel has not been impaired. Vandalism continues at the site as indicated by new bullet holes in several perimeter signs. The seismic monitoring station installed on site in 2007 as part of the EarthScope USArray Project continues to collect data. Observation of flow from the six designated seeps was conducted during the annual inspection. One of the seeps had minimal flow, two had very small pools of standing water, and the other three were dry. No maintenance needs or cause for a follow-up or contingency inspection were identified.

### 12.2 Compliance Requirements

Requirements for long-term surveillance and maintenance of the Mexican Hat Disposal Site are specified in the *Long-Term Surveillance Plan [LTSP] for the Mexican Hat Disposal Site, Mexican Hat, Utah* (DOE-LM/1530-2007, October 2007) and in procedures established by DOE to comply with requirements of Title 10 *Code of Federal Regulations* Part 40.27 (10 CFR 40.27). These requirements are listed in Table 12-1.

Table 12-1. License Requirements for the Mexican Hat Disposal Site

Requirement	Long-Term Surveillance Plan	This Report
Annual Inspection and Report	Section 3.0	Section 12.3.1
Follow-Up or Contingency Inspections	Section 3.5	Section 12.3.2
Routine Maintenance and Repairs	Section 3.6	Section 12.3.3
Groundwater Monitoring	Section 3.7	Section 12.3.4
Corrective Action	Section 3.6	Section 12.3.6

**Institutional Controls**—The United States Bureau of Indian Affairs holds the 119-acre disposal site in trust. The Navajo Nation retains title to the land. DOE and the Navajo Nation executed a Custodial Access Agreement (CAA) that conveys to the federal government title to the residual radioactive materials stabilized at the repository site and ensures that DOE has perpetual access to the site. UMTRCA authorized DOE to enter into Cooperative Agreement DE-FC04-85AL26731 with the Navajo Nation, and the U.S. Nuclear Regulatory Commission (NRC) required it prior to bringing the site under the general license. The purpose of the Cooperative Agreement was to perform remedial actions at the former processing sites. The site was accepted under the NRC general license (10 CFR 40.27) in 1997. DOE is the licensee and, in accordance with the requirements for UMTRCA Title I sites, is responsible for the custody and long-term care of the site. Institutional controls at the disposal site, as defined by DOE Policy 454.1, consist of federal control of the property, a site perimeter fence, warning/no-trespassing signs placed along the property boundary, and a locked gate at the entrance to the site. Verification of these

institutional controls is part of the annual inspection. Inspectors found no evidence that these institutional controls were ineffective or violated.

## **12.3 Compliance Review**

### **12.3.1 Annual Inspection and Report**

The site, located south of Mexican Hat, Utah, was inspected on April 29, 2008. Results of the inspection are described below. Features and photograph locations (PLs) mentioned in this report are shown on Figure 12–1. Numbers in the left margin of this report refer to items summarized in the “Executive Summary” table.

#### **12.3.1.1 Specific Site-Surveillance Features**

**Access, Fence, Gate, and Signs**—The site is accessed via a short, unmarked dirt road off U.S. Highway 163, approximately 1 mile south of the San Juan River, which heads east and ends at a graded parking area. The access road crosses Navajo Nation land and access is granted under the CAA. Erosion continues to occur along the dirt road, but the site continues to be accessible; no repairs are necessary at this time. Trash, including substantial quantities of broken glass, accumulates along the entrance road and in the parking area.

A barbed-wire perimeter fence surrounds the disposal cell and is located the site boundary. Other than loose wires present at one location near the north diversion channel, the perimeter fence was in excellent condition. Periodically, the fence is damaged by livestock or erosion and requires repair.

A double-swing chain-link entrance gate is located in the perimeter fence near the northwest corner of the site. The center rod of the gate is damaged, causing the west half to be inoperable; however, vehicles can still access the site through the east half of the gate.

The entrance sign is located at the gate and was in excellent condition. There are 43 perimeter sign locations, and each location has a pair of signs: an upper property ownership sign and a lower radioactive materials disposal site warning sign. Perimeter sign P37, located along the west property boundary, was missing the lower radioactive materials disposal site warning sign. The remaining perimeter signs were present and legible, although several are bent or are damaged by bullet holes. Several signs, including P40, have new bullet holes (PL–1).

**Site Markers and Monuments**—The two site markers, four survey monuments, and 12 boundary monuments were inspected. Both site markers and all survey and boundary monuments were in good condition. Boundary monument BM–11, located in an area subject to erosion, remains stable. The markings on survey monument SM–5 are illegible; however, no action is required at this time.

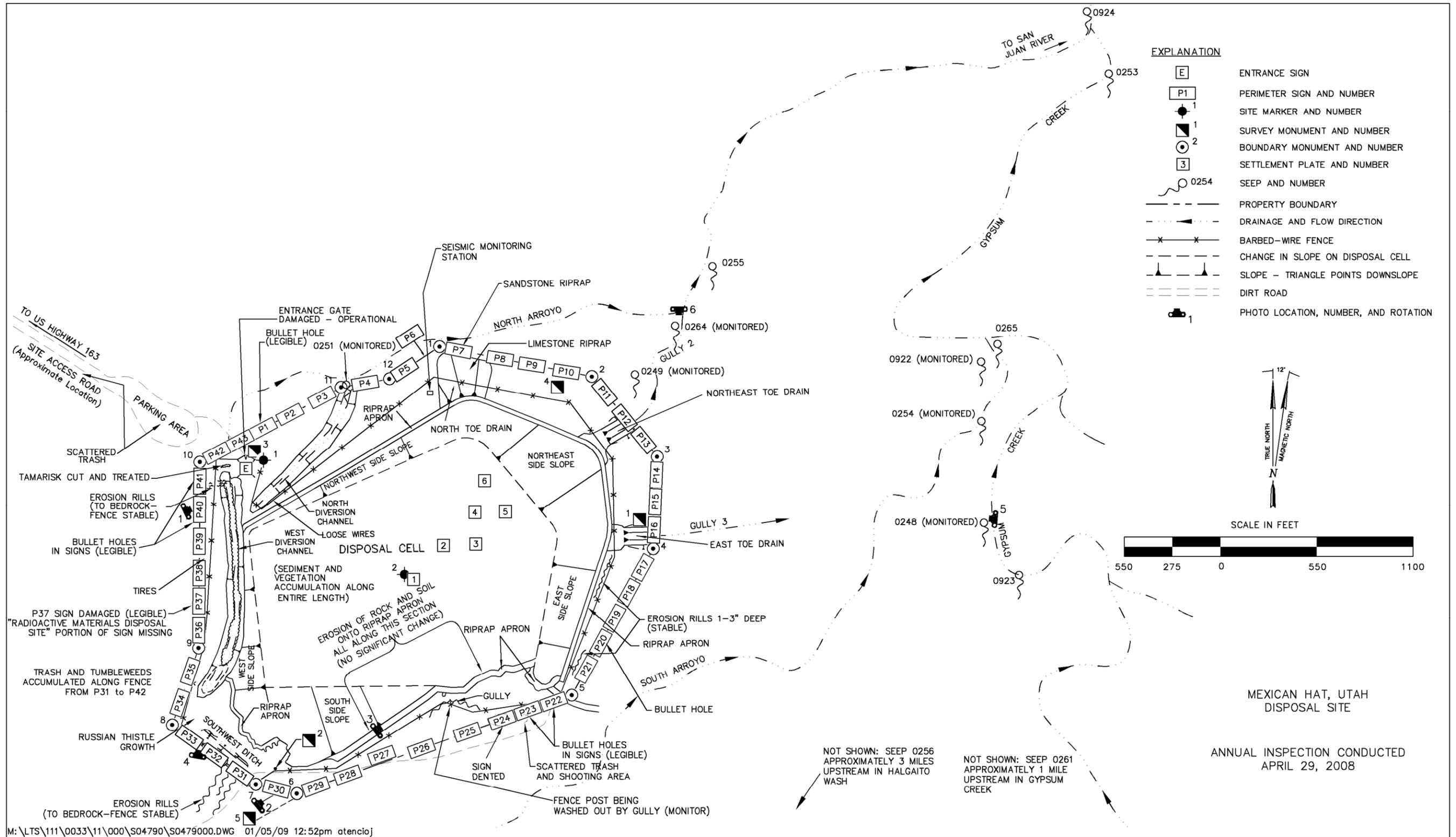


Figure 12-1. 2008 Annual Compliance Drawing for the Mexican Hat Disposal Site

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**Settlement Plates**—There are six settlement plates on top of the disposal cell. All were secure and in good condition. No visual evidence of settlement occurring on the disposal cell cover was observed. Surveying of the settlement plates was conducted for several years following cell construction but is no longer required.

**Monitor Wells**—In April 2007, the four remaining monitor wells (MW-0899, MW-0934, MW-0935, and MW-0909) at the site were decommissioned following concurrence by the Navajo Nation that groundwater monitoring is not required to maintain protectiveness.

### 12.3.1.2 Transects

To ensure a thorough and efficient inspection, the site was divided into four transects: (1) the riprap-covered disposal cell top slope, (2) the riprap-covered side slopes and diversion ditches, (3) the area between the disposal cell and the site boundary, and (4) the outlying area.

Within each transect, inspectors examined specific site-surveillance features, such as the entrance gate and sign, survey and boundary monuments, perimeter signs and fences, and site markers. Inspectors examined each transect for evidence of erosion, settling, slumping, and other disturbances that might adversely affect the site's integrity or long-term performance.

**Top of Disposal Cell**—The top of the riprap-armored disposal cell was in excellent condition (PL-2). There was no evidence of differential settling, cracking, burrowing, or other modifying processes that could affect the integrity of the cell. All visible components of the disposal cell and cover were functioning as designed. No vegetation was observed to be growing on top of the disposal cell.

**Side Slopes, Toe Drains, Aprons, and Diversion Channels**—The disposal cell side slopes, toe drains, aprons, and diversion channels were in excellent condition and functioning as designed.

The sloughing of red country rock and soil along the south apron does not appear to have increased significantly during the past year. Because the apron in this area is immediately adjacent to the steep rocky cliff face along the southern edge of the disposal cell cover (PL-3), it is anticipated that a certain amount of sediment and unstable rock from the cliff face will, over time, continue to fall onto the apron. This area has been inspected for several years with little or no change being observed from year to year. The relatively minor accumulation of material that is anticipated to occur from year to year is expected to have no detrimental impact on the performance of the apron or the disposal cell. As a best management practice, inspectors will continue to monitor this area; however, no detrimental impact on the performance of the disposal cell from this fallen material is expected.

Areas off site and upgradient continue to erode and transport sediment onto the site and into the West Diversion Channel (PL-4). The sediment accumulation has promoted the growth of vegetation in the channel, including perennial grasses and annual weeds; however, the sediment and vegetation are not affecting the performance of this drainage structure.

One small tamarisk plant was present at the north end of the West Diversion Channel and was sprayed with herbicide. Though present in the arroyos outside of the site, no other tamarisk plants were observed on the site. Growth of tamarisk will continue to be controlled on the site.

**Area Between the Disposal Cell and the Site Boundary**—Erosional rills and gullies continue forming along the western edge of the site boundary primarily upgradient of, and between, boundary monuments BM-7 and BM-8. This is an expected natural process and a result of the site's stabilizing and coming to equilibrium with the outlying areas. Erosion in these areas will continue to be monitored, but it is not a concern unless it damages the perimeter fence or impacts the performance of the West Diversion Channel.

In 2007, a seismic monitoring station was installed inside the perimeter fence on the north side of the disposal site. Seismic monitoring is being conducted under the EarthScope USArray Project, a project funded by the National Academy of Sciences for the purpose of collecting seismic data every 200 square miles across the entire continental United States and Alaska. The seismic monitoring station will collect data at the site for a period of 2 or 3 years, after which the station will be removed. The disposal site location was desirable, in part, because it is located in a controlled area. This monitoring supports DOE's effort to provide site reuse.

12A Scattered trash (broken glass, bottles, cans, cardboard, and paper containers) accumulates in the more accessible portions of the site where vehicular access is available. The most noticeable accumulations of trash were along the entrance road and in the parking area, the areas on DOE property along the perimeter fence between perimeter signs P31 and P42, and the southern portion of the site between perimeter signs P22 and P27. Two discarded automobile tires are located on the property edge between perimeter signs P38 and P39. Periodic removal of trash may be required to maintain the integrity of the perimeter fence and to keep trash from entering the fenced area.

Tumbleweeds continue to accumulate along the west and southwest sections of the perimeter fence, primarily between perimeter signs P31 and P42. However, the tumbleweeds do not appear to be damaging the fence.

12B Trespassing just inside the disposal site property boundary (outside the perimeter fence) occurs in the same areas where trash accumulations are noted, as evidenced by vehicle and all terrain vehicle (ATV) tracks. Vandalism has increased, as indicated by new bullet holes in several perimeter signs. This is anticipated to be an ongoing problem at the site. In 2005, representatives with the Navajo UMTRA/Abandoned Mine Land office met with members of the local community to raise awareness and express concerns over these issues.

**Outlying Area**—The area surrounding the site was visually inspected for signs of erosion, development, or other disturbances that might affect site integrity or security. As discussed above, trash continues to accumulate primarily in areas immediately adjacent to the site property boundary. The areas within 0.25 mile of the site boundary appear to be popular with ATV and four-wheel-driving enthusiasts. No other changes were observed.

### 12.3.2 Follow-Up or Contingency Inspections

DOE will conduct follow-up inspections if (1) a condition is identified during the annual inspection or other site visit that requires a return to the site to evaluate the condition, or (2) DOE is notified by a citizen or outside agency that conditions at the site are substantially changed.

No follow-up or contingency inspections were required in 2008.

### **12.3.3 Routine Maintenance and Repairs**

No routine maintenance or repairs were made at the site in 2008.

### **12.3.4 Groundwater Monitoring**

Groundwater in the uppermost aquifer is not affected by the disposal cell or by legacy uranium processing-site activities because of an effective aquitard and an upward hydraulic gradient that isolates the aquifer from overlying shallow perched water. Both of these hydrogeologic conditions prevent any downward migration of overlying water into the uppermost aquifer; therefore, monitoring of groundwater within this aquifer is not required by the LTSP.

However, due to concerns raised by the Navajo Nation, groundwater monitoring was performed at the site from November 2000 to August 2002, as a best management practice. This monitoring was performed to demonstrate that no site-related contamination occurred in the uppermost aquifer and that the upward hydraulic gradient continued. The groundwater monitoring results from this 2-year period confirmed that these conditions existed, and the results were presented in the report *Resolution of Seep and Ground Water Monitoring at the Mexican Hat, Utah, UMTRCA Title I Disposal Site* (March 2006). This report was submitted to the Navajo Nation in March 2006. In July 2006, the Navajo Nation concurred that continued groundwater monitoring of the uppermost aquifer at the site was not necessary. As a result, DOE decommissioned the remaining four monitor wells at the site in April 2007.

### **12.3.5 Seep Monitoring**

From 1998 through 2005, in accordance with the LTSP, and when sufficient flows have allowed, seep water quality monitoring was performed as a best management practice due to concerns raised by the Navajo Nation over cell performance and historical processing-site-related contamination. In 2006, an evaluation of the Seep-Monitoring Program was conducted and presented in the report *Resolution of Seep and Ground Water Monitoring at the Mexican Hat, Utah, UMTRCA Title I Disposal Site*. Based on the monitoring results, the hydrogeological conditions at the site, the continued low flows from the seeps, and the absence of any receptors, a recommendation was made to discontinue water quality monitoring of the seeps in lieu of observations of seep flow rates during annual site inspections. Annual observation of seep flows will continue with the understanding that if seep flows were to significantly increase, as compared to historical levels, water quality monitoring would resume. In July 2006, the Navajo Nation conditionally concurred in these recommendations. The report was submitted to NRC in August 2006.

The site LTSP was revised and submitted to NRC in October 2007 to reflect the Navajo Nation's concurrence in discontinuing water quality monitoring of the seeps in lieu of continuing annual observations of seep flows, and to present the results of the best-management-practice groundwater monitoring performed, as discussed previously. The revised LTSP states that the annual observation of seep flows will continue for a minimum of 10 years, at which time, an evaluation will be performed to determine the need to continue seep-flow monitoring. The revised LTSP states that if the seep flows were observed to have significantly increased, as compared to historical levels, the need to resume water quality monitoring would be reevaluated.

12C In accordance with the revised LTSP, visual monitoring of seep flows was conducted during the 2008 annual inspection. The flows of six seeps were observed and documented to be negligible or nonexistent. The seeps are primarily the result of perched water that leaked from the former-processing-site tailings pond for many years; to a lesser degree, they are also the result of transient drainage from the wet tailings placed within the disposal cell. Seep flows are anticipated to diminish over time; however, a minor amount of recharge does occur, as evidenced by the presence of seeps upgradient of the former processing site and disposal cell. Historical documentation and records also indicate the presence of seeps prior to former-processing-site operations. Warning signs advising the public to not drink the water remain posted at the seep locations.

All seeps observed during the 2008 site inspection are listed in the LTSP, except Seep 0264 (which replaced Seep 0249 in 1995 because of insufficient flow for sampling). Minimal flow was observed only at Seep 0248 (PL-5). Only a minor amount of standing water was found in two of the Seeps—0248 and 0264 (PL-6); of the remaining four seeps, three were dry, and one had some moist soil. Table 12-2 provides observations and qualitative descriptions of seep flows.

Table 12-2. Description of Seep Flows at the Mexican Hat Disposal Site

Seep Location Number	Drainage	Hydrological relationship to Disposal Cell	Observations and Qualitative Descriptions of Seep Flow
0248	Gypsum Creek	Downgradient	Minimal flow running down and dripping from adjacent rock face. Very small pool of standing water (~1' diameter, ~1" depth); no flow from the pool or the immediate area. Soils moist in immediate area surrounding the seep. Vegetation consists primarily of tamarisk (very little other riparian vegetation).
0249	Gully 2	Downgradient	Dry; no evidence of a seep (i.e., no moist soils or riparian vegetation present).
0251	North Arroyo	Downgradient	Moist soil present but no observed flow; evaporites present. Minimal vegetation—primarily tamarisk (very little other riparian vegetation).
0254	South Arroyo	Downgradient	Dry; no flow, standing water, or moist soil present. The minor amount of evaporites present is the only evidence of soil moisture or seep. Very little riparian vegetation besides tamarisk.
0264	North Arroyo	Downgradient	No observed flow but a small pool of standing water (in animal tracks) and a substantial area of moist soil and evaporites present. Vegetation consists primarily of tamarisk.
0922	South Arroyo	Downgradient	Dry; no flow, standing water, or moist soil present; evaporites present. Vegetation consists primarily of tamarisk.

The flow and small pool observed in Seep 0248, located in Gypsum Creek and cross-gradient from the disposal cell, were similar to observations during the 2 previous years. Seep 0264, located directly downgradient of the disposal cell at the confluence of North Arroyo and Gully 2, was wetter than observed in 2007 (only a small moist area was present at that time) but had less standing water than was observed in 2006. Seep 0251 had some moist soil (it was dry in 2007), and Seep 0922 was dry this year (minimal flow was observed in 2007). Seeps 0249 and 0254 continued to be dry.

### 12.3.6 Corrective Action

Corrective action is taken to correct out-of-compliance or hazardous conditions that create a potential health and safety problem or that may affect the integrity of the disposal cell or compliance with 40 CFR 192.

No corrective action was required in 2008.

### 12.3.7 Photographs

*Table 12–3. Photographs Taken at the Mexican Hat Disposal Site*

<b>Photograph Location Number</b>	<b>Azimuth</b>	<b>Description</b>
PL–1	65	Perimeter sign P40.
PL–2	50	The southeast portion of the disposal cell.
PL–3	55	The disposal cell apron along an area that tends to slough.
PL–4	10	The west diversion channel.
PL–5	275	Seep 0248 in Gypsum Creek.
PL–6	180	Seep 0264 in the North Arroyo.



*HAT 4/2008. PL-1. Perimeter sign P40*



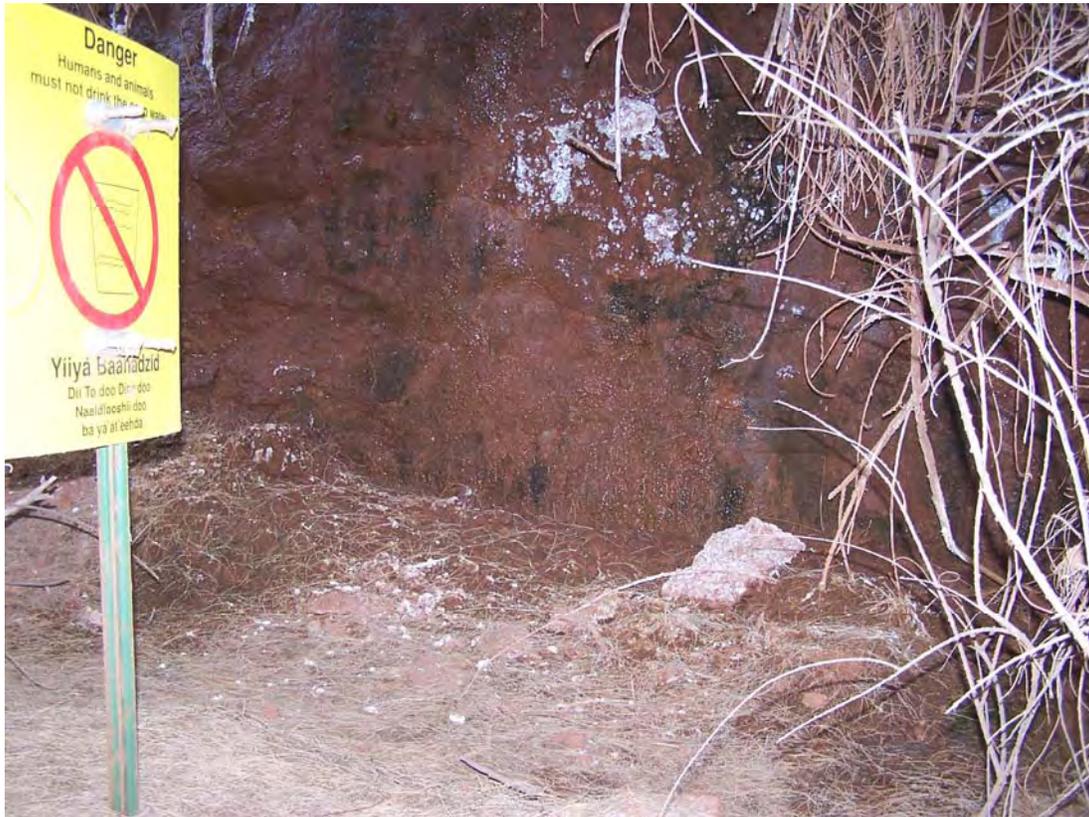
*HAT4/2008. PL-2. The southeast portion of the disposal cell.*



*HAT 4/2008. PL-3. The disposal cell apron along an area that tends to slough.*



*HAT 4/2008. PL-4. The west diversion channel.*



*HAT 4/2008. PL-5. Seep 0248 in Gypsum Creek.*



*HAT 4/2008. PL-6. Seep 0264 in the North Arroyo.*